

Medical Schools of the West

The UCLA School of Medicine

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One of a continuing series of reports from the medical schools of the West

The aims and values of the University of California, Los Angeles (UCLA), School of Medicine were formulated as follows in its *Institutional Self-Study* published in 1980:

- To provide high-quality education for undergraduate and graduate students preparing to serve in all branches of medicine;
- To contribute to the production of outstanding teachers of these disciplines;
- To foster biomedical research.

Thus the school's *raison d'être* is to sustain a faculty, a diversity of students and an environment conducive to the discovery and sharing of knowledge relevant to medicine.

The faculty and facilities of the school also accommodate the following related goals:

- To educate students in fields cognate to medicine, such as biochemistry, physiology and pharmacology;
- To contribute to the education of students of dentistry, nursing, public health and other health fields;
- To provide the highest quality of medical care and preventive medicine, from primary medical care to tertiary diagnosis and treatment, in response to the needs of individuals and of society;
- To address such problems as the organization and availability of medical services; the distribution of medical care as to specialty and geography; the lifelong education of physicians and other health professionals;
- To strengthen the intellectual life of UCLA and the University of California;
- To contribute to the world's progress towards health and peace through the international exchanges of students and faculty and the education of foreign students and fellows who return to their countries.

The subcommittee on objectives for the Institutional Self-Study Task Force concluded its write-up with the following summation:

The school is concerned with problems of human beings and society. It tries to respond to the needs of the community, the region, the nation, and, to some extent, the society of nations. At the same time, the Task Force firmly holds

the belief that pursuit of knowledge for its own sake, without immediately apparent social relevance, is rightly the province of many of the school's faculty members. Respect for such research is frequently essential for recruitment of the most inspiring teachers. Moreover, history teaches us that the ultimate benefit to mankind of such research is unforeseeable, indispensable and incalculable.

Research

From its conception in the late 1940s the new medical school on the UCLA campus was destined to make an early and enduring mark in research. It came into being when the nation was entering its post-World War II era of unprecedented public interest in and support for biomedical research (Figure 1).

Exemplary of interdisciplinary research at UCLA are tissue typing and positron emission tomography (PET). UCLA investigators developed a systematic method of human leukocyte antigens typing and were the first to apply it to renal transplantation. They originated the microcytotoxicity assay, now the worldwide technique for serologic typing, and identified new histocompatibility antigen specificities. Automated instrumentation designed for the typing of sera has wide applications in the burgeoning field of monoclonal (pure) antibody production.

The dramatic new nuclear medicine technique of positron emission computed tomography originating at UCLA is a benign, relatively noninvasive process that combines external radiation detection with mathematical image reconstruction to show the relationship among function, metabolism and structure. PET records the three-dimensional distribution of injected radionuclide emitted from a patient and portrays on a television screen a vivid cross-sectional picture of biochemical activity that can be coordinated with computed tomographic studies to show function and structure relationships. It may also be correlated with neurologic, cognitive and behavioral findings. The short-lived isotopes that PET requires are made by UCLA's biomedical cyclotron—one of the few in the nation close enough to a hospital to be practical for human

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ABBREVIATIONS USED IN TEXT

CME=continuing medical education
 NIH=National Institutes of Health
 PET=positron emission tomography
 UCLA= University of California, Los Angeles
 VA=Veterans Administration

use. So far, PET has been mainly used in studies of the heart and the brain.

In the Department of Anatomy abnormal orientations of anterior hippocampal pyramidal cells have been found in the brains of schizophrenic patients. Structural sex differences in the brain are showing how the hormonal environment in embryonic rats determines different brain development in male and female rats. Vision research is clarifying the senescence of the pigment epithelium and degenerative diseases of the macula and retina. The reticular formation in the brain was found to be of vital importance in sleep, arousal and focusing attention.

Developments from the Department of Anesthesiology include a noninvasive method of estimating pulmonary blood flow in anesthetized patients; techniques for monitoring catecholamines that improve anesthesia efficacy and safety; a new neuromuscular blocking agent, and a noninvasive transcutaneous oxygen monitor.

Researchers in the Department of Biological Chemistry were the first to determine the importance of histones in the structure of chromosomes. Determinations of the structure of pituitary thyroid-stimulating and pituitary luteinizing hormones have led to better diagnostic immunoassay methods, including one that detects elevated levels of prostatic acid phosphatase in patients with prostatic carcinoma. Studies of glycoproteins and glycolipids of cell surfaces have revealed the mechanism through which specific viruses recognize and infect target cells. Some mechanisms of DNA damage and repair have been detailed.

UCLA was among the first medical schools to recognize the essentiality of computers to progress in health sciences and to create (in 1967) a strong Department of Biomathematics. Developments here include innovative statistical methods

for tissue transplantation research; plotting radiation treatment and screening for carcinogens in cancer research, and new biomathematical processes for exploring how diseases are inherited and how drugs and other metabolites circulate in the body.

Investigators in the Department of Medicine have discovered genetic defects of erythrocyte metabolism responsible for nine kinds of hemolytic anemia. Defects of cholesterol metabolism in leukocytes have been correlated with some kinds of atherosclerosis. Fetal pancreatic transplants in rats signify progress towards future islet transplants in humans to treat patients with diabetes mellitus. An innovative balloon flotation catheter that is threaded into the heart has revolutionized the care of patients with acute cardiac disease. Acquired immune deficiency syndrome was first characterized at UCLA. A unique human T-cell line (named Mo) that produces most of the known lymphokines and activates host-defense cells has been developed. The role of peptide hormones in the gastrointestinal tract, brain and retina has been clarified. The International Olympics Committee awarded a contract to Clinical Pharmacology for testing drug use by athletes in the 1984 Olympic games in Los Angeles, and the resulting capability is proving useful in many areas of research.

In the Department of Microbiology and Immunology, workers have shown that the herpes simplex virus travels in nerve axons, establishes latent infections in the sensory ganglia and can be reactivated from this site. Findings from inserting cloned treponemal genes and cloned influenza hemagglutinin genes in *Escherichia coli* are leading to more exact immunizations. Studies in tumor immunology have shown that cell-mediated cytotoxicity of tumor cells is mediated by soluble factors released by cytotoxic cells. Genes and gene products of some viruses involved in virulence for various organ systems are being defined. Individual genes from virulent agents are reinserted into the DNA of avirulent viruses and the function of the corresponding gene product is studied. The cloning and expression of influenza virus genes in bacteria and animal cells are increasing the knowledge of how these viruses reproduce and may lead to a genetically engineered flu vaccine.

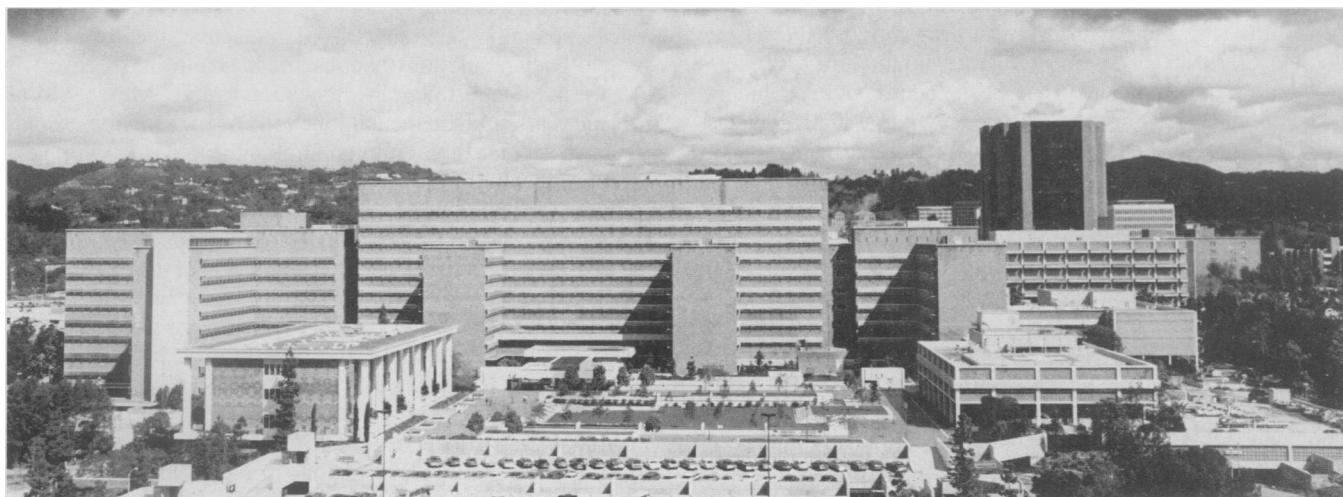


Figure 1.—The UCLA health sciences complex facing north to the UCLA campus and the hills of Bel Air. The building on the front left shows the portasanta marble exterior and classical colonnades of the Jules Stein Eye Institute. The building on the front right is the Marion Davies Children's Clinic. The medical center looks over the Neuropsychiatric Institute and Reed Neurological Center on the left and the School of Dentistry on the right. Towering over the complex on the far right is the Jonsson Comprehensive Cancer Center.

The Department of Neurology, long a center for interdisciplinary work in epilepsy, has been designated a comprehensive urban epilepsy center by the National Institutes of Health (NIH). PET scans are improving the pinpointing of seizure foci and surgical treatment of patients with partial complex epilepsy is proving safe and effective in selected cases. Other research is focused on the basic causes of demyelinating diseases such as multiple sclerosis and myoneural junction diseases such as myasthenia gravis.

Clinical investigators in the Department of Obstetrics and Gynecology are adding to knowledge of the endocrine precursors of endometrial cancer, endocrinologic changes in menopause, basic physiology of mother and fetus in pregnancy, the management of cases of ovarian cancer, cancer chemotherapy, biochemistry of the amniotic fluid, biochemical delay of premature labor and anatomical principles in correcting pelvic support. Studies of ovulation induction use the ultrasound monitoring of follicular development, and a program of in vitro fertilization initiated in 1983 has achieved a pregnancy rate of 30%.

The Department of Ophthalmology (Jules Stein Eye Institute) is 1 of 12 participants in the nationwide Retinitis Pigmentosa Study. Investigations are under way on the mechanism of vitamin A transport, immune mechanisms of the retina, differentiation of retinal photoreceptors, retinal cyclic nucleotide metabolism, and gene mapping. Other research by UCLA ophthalmologists includes the management of glaucoma, corneal infections and transplants, hereditary aspects of retinal disease, biochemistry and biophysics of the crystalline lens, ophthalmic ultrasonography, diabetic retinopathy (in conjunction with the nationwide Early Treatment Diabetic Study), ocular herpes simplex and autoimmune disorders. Research is improving helium ion heavy-particle irradiation for choroidal melanoma.

Researchers in the Department of Pathology have found that aging is regulated by the same master control system of genes that influences immunity and are seeking ways to modify the aging process. Other research explores cancer, viral disorders, arteriosclerosis, bone disease, immunopathology, renal disease and the chemistry of erythrocytes.

Investigators in the Department of Pediatrics have reported the first successful use of a drug to close the patent ductus arteriosus of some premature infants. A reversible cellular immunodeficiency has been identified in malnourished infants and children. Home parenteral nutrition has provided a model for worldwide adaptation. Advances have been made in hemodialysis and ambulatory peritoneal dialysis and in renal transplantation. The two-dimensional echocardiographic imaging technique for noninvasive diagnostic testing for congenital heart disease developed here is now widely used at cardiac centers. Basic and clinical research has yielded valuable findings in fetal and perinatal thyroid physiology, screening for congenital hypothyroidism, thermogenesis in the newborn, surfactant biology, replacement therapy for hyaline membrane disease and the role of pituitary peptide, catecholamine and carbohydrate metabolism in the neonate. Other problems explored are the pathogenesis and taxonomy of chondrodystrophic dwarfism, hereditary transmission of diabetes mellitus, genetic screening and prenatal diagnosis of Tay-Sachs disease and the molecular biology of gene activation and repression. Research also goes ahead on

the ontogeny of leukocyte movement, the epidemiology of group B streptococcal infection of mother and newborn and the pathogenesis of persistent viral infections of the central nervous system and multiple sclerosis.

In the Department of Pharmacology discoveries have been made on the role of pituitary, thyroid and adrenal cortical hormones in opiates and addictions to other drugs. β -Endorphin, a 31-amino-acid peptide with morphinelike properties, has been found to increase plasma level of prolactin but not growth hormone, to lower blood pressure and heart rate, to improve depression modestly and not to affect schizophrenia. The ability of steroids to reverse drug-induced down-regulation has been documented and the possibility of receptor up-regulation in cases of rebound hypertension after clonidine withdrawal is under investigation. A new compound called xylamine has been developed and is being used to identify a protein in neuronal cell membranes that transports transmitter from the cell's outside to its inside. This could be the first radioactive tool for studying the presynaptic nerve terminal—the site of action of psychoactive drugs. The gas chromatography-mass spectrometry facility, conducted jointly with the UCLA Brain Research Institute, collects data on compounds as a function of their concentrations. Such data have important uses in controlling environmental carcinogens, accuracy of biomedical research and optimal safety-efficacy of medication.

In the Department of Physiology new methods for measuring heat production in contracting muscles and assessing underlying chemical changes have been designed. Work on the ionic compartments in cardiac muscle, especially calcium ions, which determine the intensity of excitation-contraction coupling in the myocardium, has elucidated the action of digitalis. The development of the electron microprobe analysis has allowed quantitation of different ions in a cell and the picoliter or "microdroplet" analysis of many elements important in nephrology and gastroenterology. Studies in epithelial transport physiology are illuminating lithium transport in the understanding of manic-depressive diseases. Knowledge of the molecular mechanisms of ionic specificity in membranes has been applied to excitatory phenomena. Other research is extending physiology as a central biomedical science—spanning the range from molecular mechanisms to whole-body regulation of human life in health and disease.

In the Department of Psychiatry and Biobehavioral Sciences research on mental function and dysfunction extends from molecular biology to cultural anthropology—with special emphasis on alcoholism, mental retardation, schizophrenia and childhood psychoses. An "intelligent speech prosthesis" has been developed for persons with aphasia. Improvements in the psychiatric diagnosis of the elderly have helped discover treatable conditions. New ways to predict drug effects in selected patients with severe psychiatric illnesses have been charted and a diagnostic instrument that detects incipient dyskinesia from psychotropic medication has been found.

In the Department of Radiation Oncology a new fast-neutron therapy facility, one of four in the nation designed for clinical research, is being constructed. Intralymphatic immunotherapy (using cultured allogeneic melanoma cells) has produced evidence of clinical response in metastatic melanoma. Limb salvage and bone marrow transplantation are increas-

ingly successful, and a γ -teletherapy knife has proved valuable in treating small intracranial lesions. Radiation biology is being studied in a large germ-free animal laboratory.

In the Department of Radiological Sciences a new diagnostic image-processing laboratory combines computed tomography, nuclear magnetic resonance, positron emission tomography, digital radiography, ultrasound, x-ray and other conventional imaging techniques in carrying out diagnostic image analysis.

In the Department of Surgery an endorectal ileal pull-through operation with internal ileal reservoir for treating some forms of ulcerative colitis and multiple polyposis has obviated bladder dysfunction and impotence from proctocolectomy and avoided a permanent ileostomy stoma. Splenic conservation and repair, including partial splenectomy, have been refined to the point they are now standard in this country and many others. The right-angle Hopkins rod telescope that allows better visualization of the larynx, nasopharynx and upper respiratory tract has been adopted widely. On-line computer analysis of nystagmus helps in the understanding of vestibular dysfunction. Bone morphogenetic protein is showing promise for bone regeneration and cell differentiation. Total knee, hip and shoulder replacements are steadily proving more effective and clinical trials of a new fixation system for resurfacing hip joint replacements are yielding good results. Advances in surgical oncology include the clonogenic assay for testing the sensitivity of tumor cells to chemotherapeutic agents; the preservation of limbs by preoperative administration of doxorubicin (adriamycin) hydrochloride, followed by irradiation and en bloc resection, and hyperthermia for treating extensive cancers in visceral organs.

Education

The initial target class size of 128 first-year students (increased some 10% by transfers to the third-year class) was reached in 1968. By then, however, a looming physician shortage primed an increase to 144 first-year students in 1972. National expansion of medical education in the 1970s proved overextended in the 1980s, and the UCLA class size has now been reduced to 140 (Figure 2).

Each year since 1979 as many as 24 medical students in the University of California, Riverside-UCLA Biomedical Sciences have joined the UCLA medical curriculum after their third year of undergraduate education at Riverside. In 1981 the first annual group of as many as 24 students in the Charles R. Drew Postgraduate Medical School-UCLA School of Medicine program entered the first year of the UCLA medical curriculum, taking the first two years at UCLA and the last two years at the Drew-King Center. The 24 Drew students are included in the 140 first-year places at UCLA and the 24 Riverside students are in addition to the 140.

With the graduation of 173 seniors in the class of 1984, 2,999 physicians have earned the MD degree at UCLA. Since 1970 the percentage of women and minorities has greatly increased. Some 90% of the alumni stay in California to practice. Other states they prefer are Hawaii, Alaska, Colorado, Arizona, Texas, Washington and Oregon above all, and on the East Coast, New York, Massachusetts and Maryland. About 10% of UCLA graduates are in faculty positions in the

United States. Alumni include department chairpersons, health administrators, NIH research chiefs and practicing physicians in all disciplines. The medical school is proud of all its graduates and grateful for their services to medicine and society (Figure 3).

The first medical curriculum at UCLA conformed to the pattern of American medical curricula (two years of basic sciences, then two years of clinical clerkships) that had changed little since 1920. By the 1960s it was seen at UCLA that this rigid structure could no longer contain the informa-



Figure 2.—Sherman M. Mellinkoff, MD, Dean of the UCLA School of Medicine since 1962.

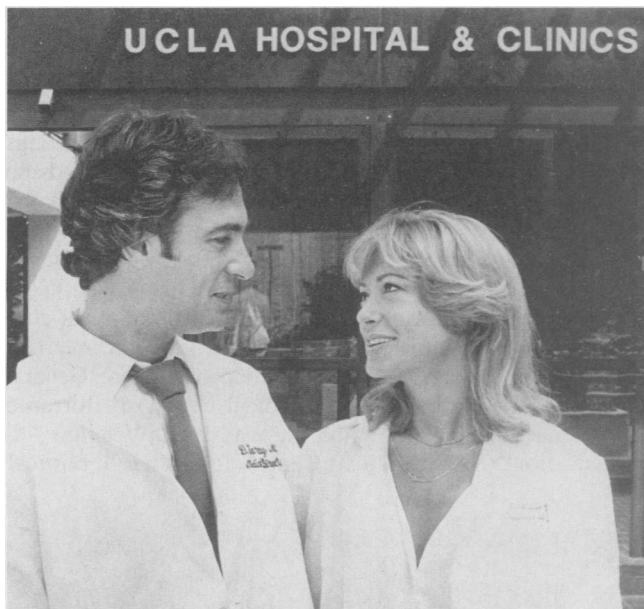


Figure 3.—UCLA medical alumni David Barcay (class of 1976), director of emergency medicine at Midway Medical Center in Los Angeles, and wife Barbara Hayden (class of 1980), plastic surgery resident at UCLA.

tion explosion resulting from accelerating discoveries in biomedical research and the desire of medical students for greater freedom of choice. A curricular revision committee (chaired by David H. Solomon, MD) designed a new curriculum that started the third year of clinical clerkships in the summer following the sophomore year and reserved three quarters for electives. The new curriculum was started in 1966 for the first-year class of 1970. In 1975 another innovation combined the last two years in a "clinical continuum" consisting of four quarters of required clerkships and three quarters of electives.

The junior-senior clinical continuum aims at giving students maximum freedom to realize individual interests consonant with mastering the basic clinical training essential for physicians in general. This is achieved by blending 50 weeks of required clinical clerkships with 28 weeks of electives; 16 weeks are available for vacation. Required clinical clerkships are in medicine (12 weeks), surgery (12 weeks), pediatrics (6 weeks), obstetrics and gynecology (6 weeks), psychiatry (6), primary-care preceptorship (2), neurology (2), radiology (2), dermatology (1) and ophthalmology (1). The following three types of electives are offered: advanced clinical clerkships; advanced clinical clerkships with primary patient responsibility (subinternships), and depth electives. Depth electives, many interdepartmentally organized and taught by both clinicians and basic scientists, emphasize clinical skills along with the pathophysiology and molecular factors in disease processes and may be research oriented. Most electives are of four weeks' duration and many entail prerequisite clerkships.

The elective curriculum helps selected students to earn the PhD degree in the course of their medical education. Completion of the MD-PhD program takes six to seven years, depending on the thesis research.

Students participate in shaping the curriculum by membership on the Educational Policy and Curriculum Committee and other committees affecting the curriculum. (Students have served on key committees of the school since 1968.) The appointment of Norman Cousins to teach the patient-physician relationship from the standpoint of the patient has enhanced the humanistic resonance of the curriculum.

Integral to the curriculum are the lively preceptorship and ubiquitous one-to-one seminars on clinical logic that UCLA's superb house officers give the medical students. Physicians on the volunteer clinical faculty selflessly share their hands-on expertise and clinical wisdom with both medical students and house officers.

A farflung network of affiliated hospitals richly extends the 711-bed UCLA hospital and 209-bed UCLA Neuropsychiatric Institute as a great classroom for the clinical continuum. The affiliates were indispensable to the medical school in its early years when it relied on Harbor General Hospital (now Harbor-UCLA Medical Center) in Torrance (California) and on the neighboring Wadsworth Veterans Administration (VA) Medical Center for general clinical

training, on Saint John's Hospital in Santa Monica for obstetrics and gynecology and the Santa Monica Hospital for emergency medicine. Today the affiliates are just as essential, as they afford the wide diversity of educational opportunities inherent in the clinical continuum. The school's partners in turn benefit from the influence of a teaching program on patient care, and by the eventual return of some former medical students to practice at or near a favorite affiliate.

Harbor-UCLA (owned and operated by the County of Los Angeles) and the Wadsworth VA Medical Center continue to be among UCLA's closest affiliates. Other Los Angeles County affiliates are the Charles R. Drew-Martin Luther King Jr Medical Center and the Olive View Medical Center. Other VA affiliates are the Brentwood and the Sepulveda VA medical centers. Community hospitals affiliated with UCLA include Cedars-Sinai Medical Center, Santa Monica Hospital, Orthopaedic Hospital, Shriners Hospital for Crippled Children, Children's Hospital, Daniel Freeman Memorial Hospital, the Kaiser Foundation hospitals of Los Angeles, West Los Angeles and Panorama City, St Mary Medical Center in Long Beach, Northridge Hospital Medical Center, St Francis Medical Center, Valley Presbyterian Hospital, Venice Family Clinic, Jewish Home for the Aged of Los Angeles, Freda Mohr Multiservice Center, City of Hope Hospital in Duarte, Kern Medical Center in Bakersfield and Ventura County General Hospital in Ventura.

Both the research and education missions of the medical school are advanced by important special programs at UCLA, some of which also provide direct community service. These include the Mark Taper Center for Health Enhancement, the UCLA-University of Southern California Long Term Care Gerontology Center, the Crump Institute for Medical Engineering, the Pulmonary Rehabilitation Center and the Center for Ulcer Research and Education (CURE), founded by the late Morton I. Grossman.

The Department of Continuing Education in Health Sciences conducts continuing medical education (CME) programs responsive to the needs of practicing physicians in the community. The department emphasizes problem-solving case management rather than the comprehensive format previously favored. A new trend is workplace-related CME presented in the hospital or a physician's office.

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Columnist Jack Smith wrote that UCLA is "one of the great learning centers of the world; a city within a city, not only emanating its intellectual energy to the metropolis that surrounds it, but also attracting and absorbing the life and vitality of that metropolis. In a sense, UCLA is the heart and source of Los Angeles." The medical school's union with that "heart and source of Los Angeles" gives it the creative energy to realize the vision of its founders, faculty, graduates and friends.